



TECHNICAL MEMORANDUM

DATE: April 18, 2016
TO: Bob Egan, SME, EPA Region 5
FROM: Matt Faust, Project Manager
Bristol Environmental Remediation Services, LLC
RE: EPA Contract No. EP-W-12-009, Task Order (TO) 2012
Tower Standard Site, Lac du Flambeau Reservation, Wisconsin
March and April 2016 Site Investigation, Rev 0

The U.S. Environmental Protection Agency (EPA) retained Bristol Environmental Remediation Services, LLC (Bristol) to prepare this technical memorandum (tech memo) under EPA Contract EP-W-12-009, Task Order (TO) 2012. This tech memo briefly summarizes site activities conducted in March and April 2016, at a leaking underground storage tank (LUST) site in Lac du Flambeau, Wisconsin, on the Lac du Flambeau (LDF) Reservation. The site is referred to as the Tower Standard Site.

Unless otherwise noted, all work was performed in compliance with the Quality Assurance Project Plan (Bristol, 2015), Site Investigation Work Plan (Bristol, 2016a), and Site Safety and Health Plan (Bristol, 2016b).

SITE ACTIVITIES

On March 30 and March 31, 2016, Bristol subcontractor Coleman Engineering Company, advanced six soil borings, 16BH01 – 16BH06, using direct push drilling technology. Borings were advanced at locations selected in the field following consultation with the EPA subject matter expert (SME) and the LDF Tribal representative (Figure 1). Latitude and longitude for each soil boring is presented on Table 1.

Table 1 Soil Boring Locations

Soil Boring ID	Date Drilled	Latitude (degrees north)	Longitude (degrees west)	Total Depth (feet bgs)
16BH-01	3/30/16	45.913713467	89.913093495	30
16BH-02	3/30/16	45.913730490	89.913159829	30
16BH-03	3/30/16	45.913683436	89.913124832	20
16BH-04	3/31/16	45.913698811	89.912972296	20
16BH-05	3/31/16	45.913662247	89.913051165	30
16BH-06	3/31/16	45.913606619	89.913215927	20

Notes:

Datum is WGS84

bgs = below the ground surface

ID = identification

Bristol personnel logged the soil borings for lithology, collected in-situ photoionization detector readings, and collected soil analytical samples at depth intervals selected by the EPA SME and LDF Tribal representative. Ten primary soil samples and one duplicate soil sample were collected from the six boring locations. Soil samples were hand delivered to Pace Analytical Services, Inc. (Pace) in Minneapolis, Minnesota, for analysis of volatile organic compounds (VOCs) (including methyl tertiary-butyl ether), polynuclear aromatic hydrocarbons (PAHs), diesel range organics (DRO), gasoline range organics (GRO), and the eight Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Full analytical results were not received in time for inclusion in this tech memo. Once the analytical report is complete, Pace will email an electronic copy to the EPA SME. Table 2 presents collection date and time, associated soil borings, and depth intervals for all soil samples.

Table 2 Laboratory Analytical Soil Sample Information

Date Collected	Time Collected	Soil Boring ID	Depth Interval (feet bgs)	Sample ID
3/30/16	1300	16BH-01	11-13	16TSSL01
3/30/16	1430	16BH-02	10-12	16TSSL02
3/30/16	1500	16BH-02	22-24	16TSSL03
3/30/16	1640	16BH-03	7-10	16TSSL04
3/30/16	1710	16BH-03	13-15	16TSSL05
3/31/16	0930	16BH-04	8-10	16TSSL06
3/31/16	0945	16BH-04	0.5-2.5	16TSSL07
3/31/16	1000	16BH-05	1.5-5	16TSSL08
3/31/16	1020	16BH-05	10-15	16TSSL09
				16TSSL10 [†]
3/31/16	1130	16BH-06	15-20	16TSSL11

Notes:

† = indicates duplicate sample

bgs = below the ground surface

ID = identification

Bristol also collected groundwater samples from four existing monitoring wells: two wells at the MW-16 location (one shallow and one deep) and two wells at the MW-20 location (one shallow and one deep) (Figure 1). MW-16 locations were sampled on March 29, 2016, and MW-20 locations were sampled on April 3, 2016. Wells were sampled with a bladder pump using a low-flow groundwater sampling technique. Four primary groundwater samples and one duplicate were hand delivered to Pace to be analyzed for VOCs, sulfate, nitrate, manganese, and iron. Full analytical results were not received in time for inclusion in this tech memo. Once the analytical report is complete, Pace will email an electronic copy to the EPA SME. Groundwater sample information is presented in Table 3.

Table 3 Laboratory Analytical Groundwater Sample Information

Date Collected	Time Collected	Monitoring Well ID	Pump Depth (feet BTOC)	Sample ID
3/29/16	1030	MW-16	4	16TSGW01
3/29/16	1245	MW-16D	39.5	16TSGW02
				16TSGW03 [†]
4/3/16	1010	MW-20	9	16TSGW04
4/3/16	1135	MW-20D	22.5	16TSGW05

Notes:

† = indicates duplicate sample

BTOC = below the top of casing

ID = identification

Bristol also collected one sub-slab vapor sample and one indoor and one outdoor ambient air sample. The sub-slab sample was collected at the bait shop located at the former service station. Bristol installed a reusable port through the floor to allow for future sampling events. Following successful shut-in and helium tracer gas leak detection tests, the sub-slab vapor sample (16TSSV01) was collected into a one-liter SUMMA canister fitted with a 200-milliliter per minute flow controller. Bristol collected one indoor ambient air sample (16TSAA01) inside the bait shop and one outdoor ambient air sample (16TSAA02) on the southwest wall of the garage structure. Ambient air sample locations were selected in the field following consultation with the EPA SME and the LDF Tribal representative. Outdoor and indoor ambient air samples were collected over a 24-hour period into 6-liter SUMMA canisters fitted with flow controllers provided by the laboratory. All air samples were submitted to Pace Analytical for VOC analysis by method TO-15. Full analytical results were not received in time for inclusion in this tech memo. Once the analytical report is complete, Pace will email an electronic copy to the EPA SME. Air sample information is presented in Table 4.

Table 4 Laboratory Analytical Air Sample Information

Start Date	Start Time	Sample ID	Location	Sample Type
3/31/16	1759	16TSAA01	Bait shop interior	24-hour ambient air
3/31/16	1810	16TSAA02	Bait shop exterior, SW wall	24-hour ambient air
4/1/16	1719	16TSSV01	Bait shop interior sub-slab probe	5 minute soil vapor

One 55-gallon drum of investigation-derived waste (purge water from groundwater sampling and decontamination fluids) was generated during site activities. The drum is labeled and staged at site for future transport and disposal.

Figures are included as Attachment 1 to this tech memo. Figure 1 is a site map depicting soil boring locations, monitoring well locations, and cross section lines. Figures 2 and 3 are cross sections highlighting groundwater analytical data. Figures 4 and 5 are cross sections highlighting soil analytical data. The cross sections were generated previously but have been updated to include the locations of soil borings and soil samples from this field effort.

The field book and field forms are included as Attachment 2. Soil boring logs are included as Attachment 3.

SUMMARY AND CONCLUSIONS

Petroleum hydrocarbons are present at concentrations that are influencing groundwater at the site. The petroleum hydrocarbons are present in soils in three zones: unsaturated vadose zone soils, smear zone soils, and saturated soils below the smear zone. Groundwater in the area of the release is approximately 8.5 feet below the ground surface (bgs). The smear zone is assumed to be from 8.5 feet to 10 feet bgs.

The extent of contamination in the unsaturated zone is fairly well defined. The extent of contamination in the smear zone is not as well defined as the contamination in the unsaturated zone but is assumed to extend beyond the footprint of the contaminated

unsaturated soils. The horizontal and vertical extents of contaminated saturated soils are unknown. There has been limited soil sample collection in the saturated soils. Soil sample collection in the saturated soils is also hampered by heaving sands. The presence of fine-grained soil, especially clay, interspersed within the sand and gravel are zones where petroleum hydrocarbons can readily adsorb onto the soil particles and become long term sources to the dissolved phase groundwater plume. See the boring log for boring 16BH02 at a depth of 19 to 20 feet for an example of a clay inclusion (Attachment 3).

The horizontal extent of dissolved phase groundwater contamination is not fully characterized, primarily on the east side of the site. The vertical extent of groundwater contamination is also not fully characterized. The movement of groundwater across the site is not fully understood especially the variations in vertical movement of contaminants as well as the interaction of the groundwater plume with Haskell Lake. The fate and transport of contaminants is not understood, especially the geochemistry of the aquifer and the contaminants effects on the geochemistry. Impacts from groundwater to the sediment and surface water are unknown at this time.

RECOMMENDATIONS

This section contains recommendations for further soil, groundwater, sediment, and surface water investigation activities as well as near term remedial actions and discusses possible future remedial approaches.

Near-term groundwater investigation activities include installing two monitoring wells and further soil and groundwater characterization. One well would be a deep monitoring well near MW-16 and MW-16D. The new, deep well would be screened just above the bedrock and provide information on the concentrations at the bottom of the unconsolidated aquifer where the groundwater flows beneath Haskell Lake.

Based on previous investigations the maximum groundwater concentration of benzene was found in MW-20D (Figures 2 and 3). This well is screened at a depth of 20 to 25 feet, or an elevation of 1,550 feet above mean sea level. The wells MW-21 and MW-21D are located near the presumed source area but are screened above and below this depth. A monitoring well located near MW-21 but screened at the similar elevation to MW-20D (approximately 25 feet bgs) would provide information on concentrations in the suspected center of the plume.

Further characterization of the extents of saturated soil contamination and groundwater contamination is recommended. The objectives of this characterization would be to define the horizontal and vertical extent of groundwater contamination as well as to collect additional information on saturated soil contamination and possibly identify clay inclusions that are acting as long-term source areas in saturated soils.

The subsurface investigation can be conducted using direct push drilling equipment and a membrane interface probe (MIP). MIP provides a rapid, in the field, semi-quantitative estimate of contamination. The MIP works by heating the soil and groundwater and the volatiles enter the probe through a semipermeable membrane where the volatiles are transferred via a carrier gas to the surface where the gas can be analyzed by a variety of analytical instruments. MIP probes typically also have a soil conductivity measurement tip which can be used to differentiate between different soil types. Another option is to include a hydraulic profiling tool that can provide estimates of hydraulic conductivity. The MIP collects data continuously as the probe is being pushed. A MIP profile log is then generated in the field and can be used to guide the investigation.

Following the installation of the two deep wells and the MIP investigation the second phase of the characterization can be planned. Activities in this phase would include installation of additional wells to confirm the MIP findings and installation of upgradient wells, as needed.

Potential impacts to Haskell Lake can be investigated by collected pore water samples in the lake sediment. It is recommended that this work be performed in the winter when ice thickness is sufficient to support drilling equipment.

As an interim removal action, the area of unsaturated zone soils and possibly some of the smear zone soils can be excavated and disposed of in a landfill or some other ex situ treatment may be possible that would not require disposal in a landfill (for example, land farming).

After further characterization has occurred and the extent of soil and groundwater contamination is better understood, appropriate remedial technologies can be considered. This includes targeting source zone areas with enhanced biodegradation or chemical oxidation. The dissolved phase plume can also be treated with enhanced biodegradation. This enhanced biodegradation can include addition of an oxygen release compound or the injection of a liquid activated carbon material such as PlumeStop. Petroleum hydrocarbons will sorb onto the liquid activated carbon and then carbon provides surface area for microbes to grow and destroy mass.

REFERENCES

- Bristol Environmental Remediation Services, LLC (Bristol). (2015). Final Quality Assurance Project Plan. Revision 1. LUST Sites in Indian Country, EPA Region 5: EPA.
- Bristol. (2016a). Site Investigation Work Plan, Tower Standard LUST Site. Revision 1. Task Order 2012. Lac du Flambeau Reservation: EPA.
- Bristol. (2016b) Site Safety and Health Plan, Tower Standard LUST Site. Revision 2. Task Order 2012. Lac du Flambeau Reservation: EPA.

ATTACHMENT 1





Figures

Drawing: C:\USERS\MPACOCK\DESKTOP\TOWER\SOIL SURVEY POINT DATA\SOIL BORING SURVEY POINT DATA.DWG - Layout: FIG 3
User: MPACOCK Apr 12, 2016 - 2:31pm Xrefs: - Images: MADE.PDS VASTI LOCATION.PDS

Abbreviations

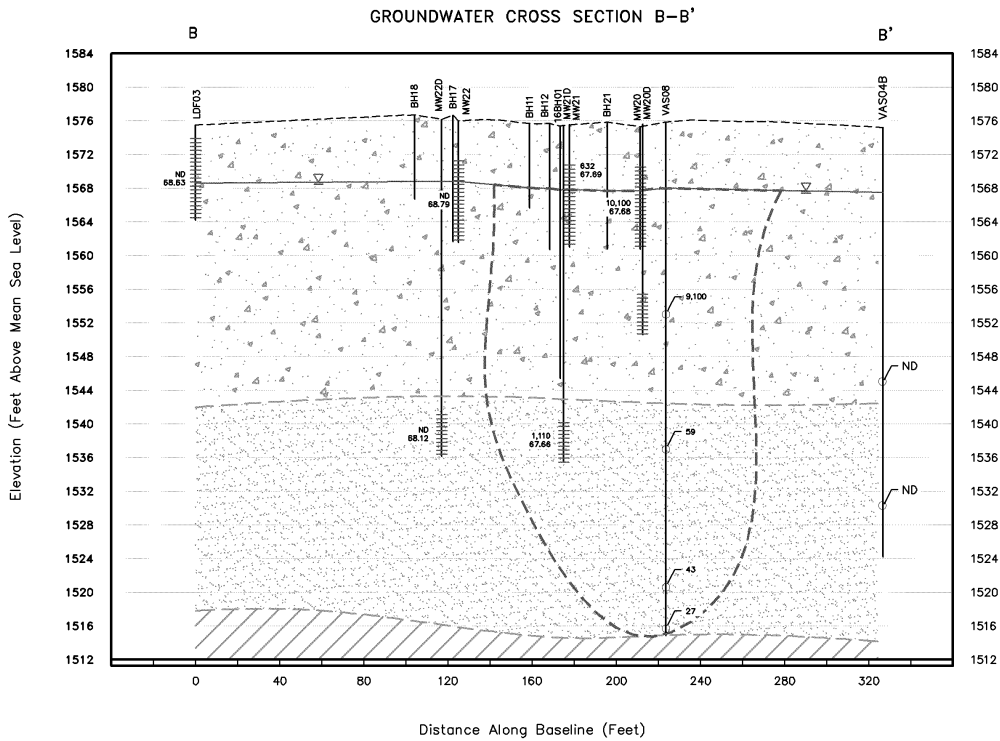
BH BOREHOLE
BOH BOTTOM OF HOLE
LDF LAC DU FLAMBEAU WELL
GW GROUNDWATER
MW MONITORING WELL
ND NOT DETECTED
PID PHOTOIONIZATION DETECTOR
PPM PARTS PER MILLION
VAS VERTICAL AQUIFER SAMPLE

Legend

 SAND AND GRAVEL
 SAND
 BEDROCK
 APPROXIMATE SHALLOW WATER TABLE
--- EXISTING GROUND
--- APPROXIMATE LIMITS OF CONTAMINATION

Notes

1. BENZENE RESULTS ARE IN $\mu\text{g/L}$.
2. PID READINGS ARE IN PPM.
3. VAS08 & VAS04B BENZENE RESULTS ARE FROM DECEMBER 2013.
4. MONITORING WELL DATA FROM NOVEMBER 2015.
5. WATER TABLE ELEVATION SHOWN IS BASED ON SHALLOW WELLS.
6. MAXIMUM CONTAMINANT LEVEL FOR BENZENE IS 5 $\mu\text{g/L}$.



Boring or Well Diagram

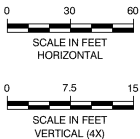
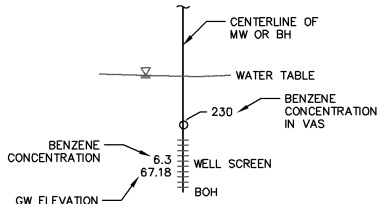
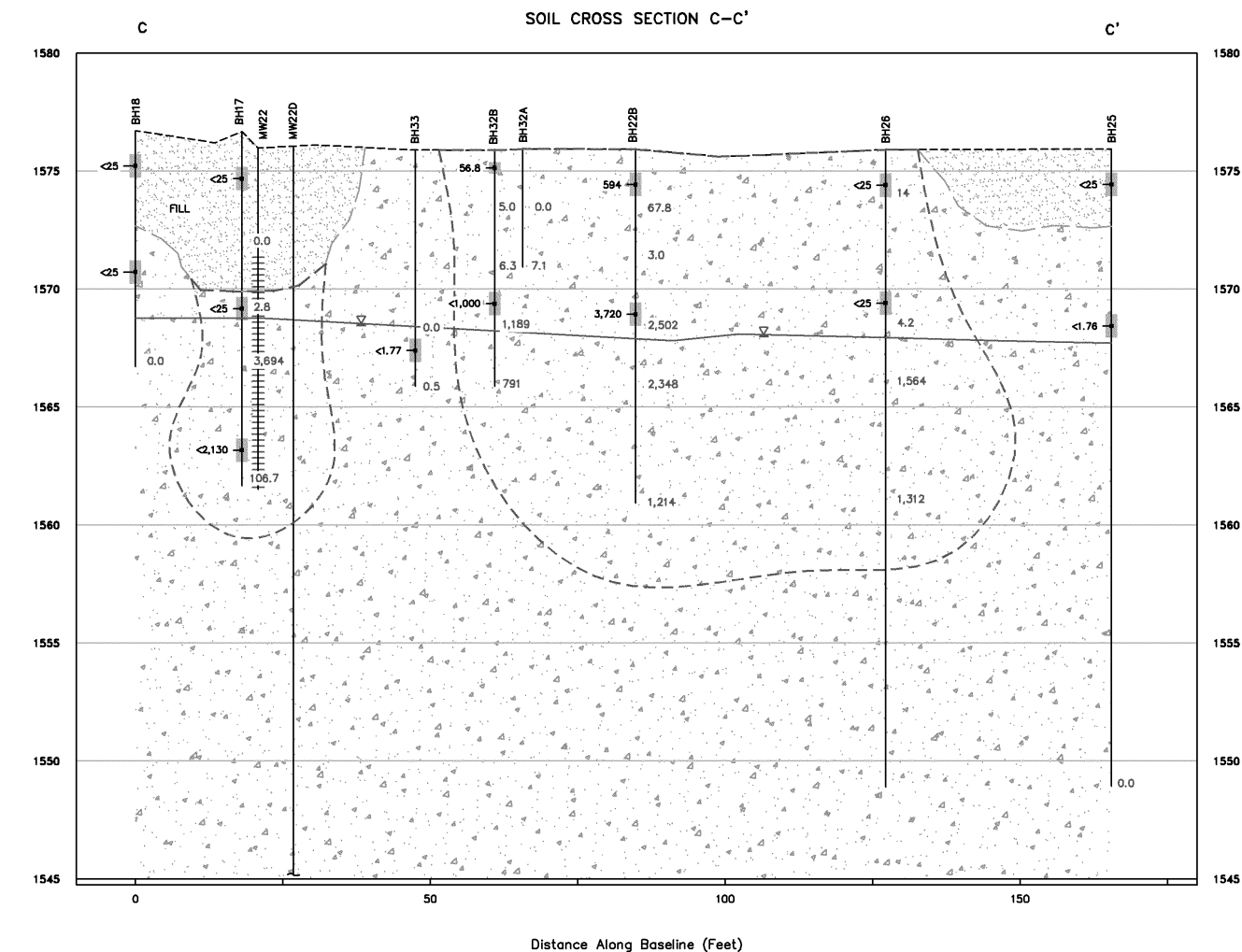


FIGURE 3
EPA 2012 TOWER
LAC DU FLAMBEAU, WISCONSIN
GROUNDWATER CROSS SECTION B-B'

\$TKUQN
ENVIRONMENTAL
REMEDIATION SERVICES, LLC
Phone (907) 563-0013 Fax (907) 563-6713

DATUM:	NA	DATE	MAR 2016
PROJECTION:	NA	DWN.	JOW
PROJECT NO.	34160024	SCALE	SHOWN
		APPRVD.	BA

Drawing: C:\JDBS\34160024 EPA 2012 TOWER\ACAD-ENVIRO\SOIL SURVEY POINT DATA\SOIL BORING SURVEY POINT DATALDWG - Layout: FIG 4
User: JMWJDR Mar 18, 2016 3:15pm Xrefs: - Images: IMAGE.PIP VAS11 LOCATION.PIP



Abbreviations

BH BOREHOLE
BOH BOTTOM OF HOLE
LDF LAC DU FLAMBEAU WELL
GW GROUNDWATER
MW MONITORING WELL
ND NOT DETECTED
PID PHOTOIONIZATION DETECTOR
PPM PARTS PER MILLION
VAS VERTICAL AQUIFER SAMPLE

Legend

SAND AND GRAVEL
SAND
BEDROCK
APPROXIMATE SHALLOW WATER TABLE
EXISTING GROUND
APPROXIMATE LIMITS OF CONTAMINATION

Notes

1. BENZENE RESULTS ARE IN µg/L.
2. PID READINGS ARE IN PPM.
3. SOIL DATA FROM NOVEMBER 2015.
4. SOIL SCREENING LEVEL IS 5.1 FROM WISCONSIN NR 140 GROUNDWATER PATHWAY PROTECTION.

Elevation (Feet Above Mean Sea Level)

Boring or Well Diagram

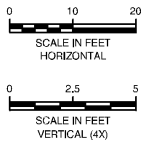
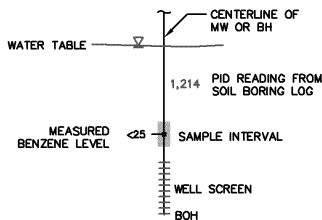


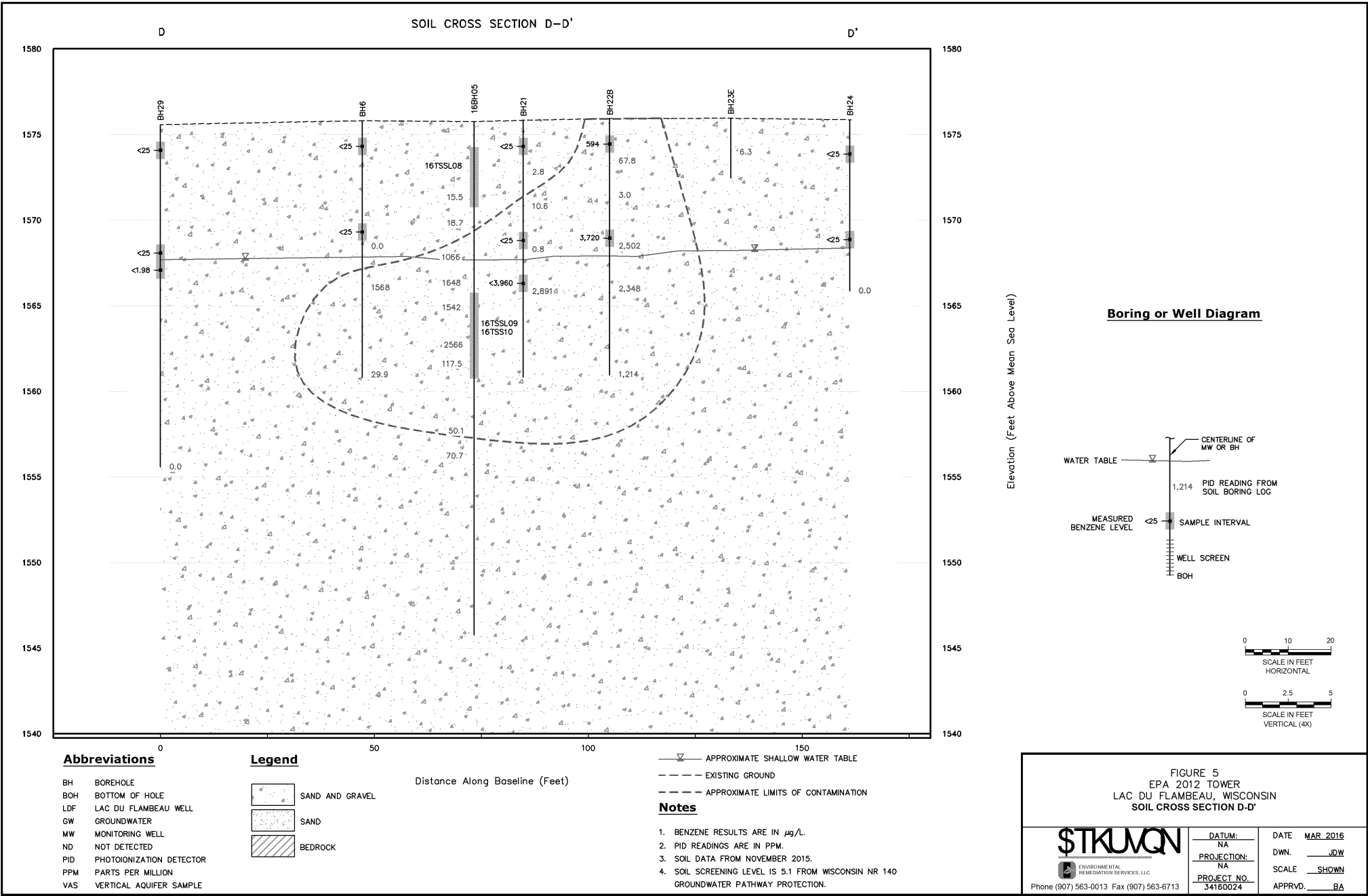
FIGURE 4
EPA 2012 TOWER
LAC DU FLAMBEAU, WISCONSIN
SOIL CROSS SECTION C-C'

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

Phone (907) 563-0013 Fax (907) 563-6713

DATUM:	NA	DATE	MAR 2016
PROJECTION:	NA	DWN.	JDW
PROJECT NO.	34160024	SCALE	SHOWN
		APPRVD.	BA

Drawing: C:\USERS\WPCOCK\DESKTOP\TOWER\SOIL SURVEY POINT DATA\SOIL BORING SURVEY POINT DATA.DWG - Layout: FIG 5
User: WPCOCK Apr 12, 2016 - 8:16am Xrefs: - Images: MADE.PDS VASTI LOCATION.PDS



ATTACHMENT 2

Field Book and Field Forms

3/27/16

3101, ' Tiber St Level, CA

d-i Y O t c b I r 5.80% 4 1

J O D 1 K P I I A W - r P f

c18 6 - atse 1 1 1 1

Drive to Minocqua - 4.5 hours

Check into Quality Inn, cooler inventory
 Bladder pump tubing from GeoTech,
 2 boxes of Summa canisters from Pace

F

I

Z

34160024

1/8 (1/1)

- 0700 Get buckets & ACE hardware, fill decans
 buckets + spray bottles w/ distilled water
- 0800 Bristol, Tribal representative and EPA SME
 on site, review SSHP and toolbox meeting
 Decan water level meter and bladder pump
 with Alamos and distilled water rinse
- 0922 Begin purge @ MW 16 (shallow)
 good recovery @ 2.3' BTOC
 turbidity dropping steadily from 50 NTU
 Discussion w/ Bob Egan (EPA SME) +
 Matt Frost (Bristol) will do PID measurements
 for soil bury in situ, rather than in
 ziplocks to conserve soil volume for sampling
- 1030 collect 16TS GW 01 (1us/msp)
 nitrate, sulfate, VOC, metals (plus Mn+Fe)
 Decan WL meter, pump, install new bladder
- 1115 Begin purge @ MW 16 D
 Pump set @ 37.5 BTOC (middle of screen)
 strong petroleum odor, no screen, clear
 cloudy after ~ 1 gallon of purge, strong bluish
 turbidity @ 250 NTU @ sampling
- 1245 16TS GW 02
- 1300 16TS GW 03 duplicate
 decan WL meter, TS, flow through cell/pump

3/29/16

8 gallons of purge water between the 2 wells
cover w/ lids + stay on site for contamination
into 55 gal drum when CEC arrives.

Matt Ernst completes Pace Co, will hand
deliver tomorrow morning to lab.

1300 - Meeting at Natural Resource Bldg in progress

1330 Drive to Nat. Resource Bldg

Bob Egan, Matt Ernst, Bob Allen (phone)

Kristen Hankin, Larry Nawronowicz

Rollbar # to be used to install 2 wells,
audit DEC site work, reporting for
corner work

Future Task Orders: 5 new wells - screening
prior to determine well placement using MIP
(membrane)

1500 Drive to Minotega
Sort coolers

Agree to take PID readings

in-situ to conserve sample
volume, Kristen

and Bob agree

3/30/16

0730 Mob. Coolers, calibrate PID

0840 Meet with Kristen + TRM office w/ Bob Egan *

0930 Arrive at site with CEC, safety meeting

1000 BHD1 ^{3 feet} SE of MW1D EVO 30'

1300 Collect 16TS6L01 from 11-13' bgs

PID readings collected in-situ - shown observed
at ~12' bgs w/ highest PID (1740)

Began BHD2 between historic BHD and BHD1 along tank
bottom

1430 BHD2 16TS6L02 10-12' bgs

1500 16TS6L03 22-24' bgs

(Sample intervals ok'd with Bob and Kristen)

* reevaluate data gaps - delineation

Bob Egan suggests MIP membrane interface probe
would be better for characterization/delineation of
contamination below the water table. Kristi

agrees. Will focus on vadose/smear contamination
data gaps for future soil removal activities

At ~20' bgs sand is stuck between sample rod
and core barrel. Low recovery +
drilling is difficult - specifically recovery of sample
barrel without also removing other core +
caving the hole in.

Loose, wet, unconsolidated sand

3/30/16

Christopher Sauri with WDEC on site.

Coordinating future work with Bob Egan

BH-3 location selected by Bob + Kristen

Move to BH-3 south of BH-1

1640 BH-3 16TSSL04 7-10' bys
(highest unsaturated PID hit in BH-3)

Interval selected by Bob and Kristen

Heaving sand - boring terminated at 20' bys

Bob and Kristen declined CEC offer to remove pump to remove collapsed sand in core in order to retrieve sample.

Additional BH-3 interval selected by Bob and Kristen

1710 16TSSL05 @ BH#3 (13'-15')
Kristen says 6 borings should be sufficient for characterization

1815 Depart site at

Purchase disposable spades at Trys for soil

Refuel rental vehicle, change PID

sample management

1930 End

12 hours

2

4

3/31/16

0730 Mob to site

0800 Arrive at site - daily safety + outjete

Bob Egan, Kristin Hansen, Elizabeth Skempkin (CE)

Randy Ochs (CE)

Select BH-4 site with Bob and Kristen

Bgn BH#4 NE of BH#1

0930 16TSSL06 8-10' bys @ water table

Interval selected by Bob and Kristen

0945 16TSSL07 0.5-2.5' bys

Interval selected by Bob Egan

Terminate boring @ 20' due to heaving sand

Move to BH#5

1000 16TSSL08 1-5' bys

1020 16TSSL09 10-15' bys

1030 16TSSL10 (Chrysotile)

Move to BH#6 south of MW#1

@ MW-20 well appears to have "sunk"
approx 4 inches - top of PVC is below sand,
in bentonite. Asphalt surrounding well is
heaved up slightly (but this may have
occurred during well install)

1130 16TSSL11 (15-20') MS/MSD Interval selected
due to good recovery in micro cone

3/31/16

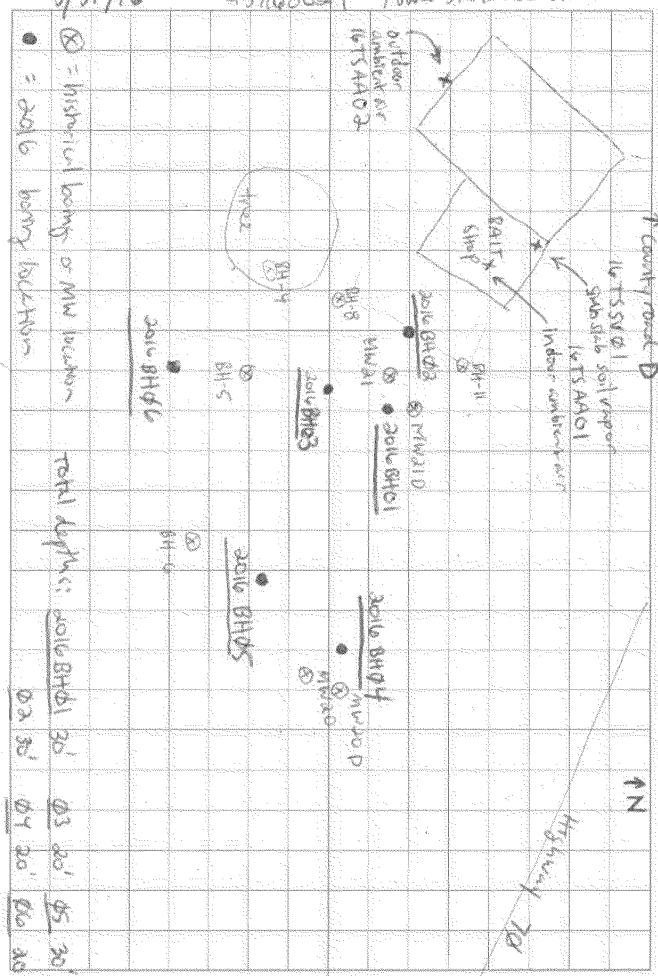
1700 Meet with Bill Kozak for access to bait shop
 16TSAAD1 can ID 971 serial # 5725
 initial vacuum: -30 mmHg
 regulator ID: 136
 start time 1759
 located in center of bait shop on floor
 16TSAAD2 outdoor ambient air behind garage
 start time 1810 (location selected by Bob Egan)
 initial vacuum: -30 mmHg
 located behind garage building on the
 ground per Bob Egan.
 1830 Replicate line for Mmagon

Haskell Lodge property owner contacted
 by Bob Egan - is in Arkansas and has no
 one to open property for us. Ambient air
 samples will not be collected
 from lodge campus during
 this site visit.

[Signature]

3/31/16

#34160024 Tower-Standard Site



3/31/16

soil sample summary

date	time	borr. ID	depth	sample ID	
3/30/16	1300	BH-01	11-13	16TSSL01	x
	1430	BH-02	10-12	16TSSL02	x
	1500	BH-02	22-24	16TSSL03	x
	1640	BH-03	7-10	16TSSL04	x
3/30/16	1710	BH-03	13-15	16TSSL05	x
3/31/16	0930	BH-04	8-10	16TSSL06	x
	0945	BH-04	0.5-2.5	16TSSL07	
	1000	BH-05	1.5-5	16TSSL08	x
	1020	BH-05	10-15	16TSSL09	x
	1030	BH-05	10-15	16TSSL10	DUP009.
	1130	BH-06	15-20	16TSSL11	MB/MSD x

Note: all PID readings in borings logs were collected in-situ

4/1/16

34160024

1000 sample management

Ace hardware for compression fittings & tubing, constructed manifold

initial vacuum, -26 mmHg (on 10" 2195")

Assemble manifold with iron fittings provided by Pace.

vacuum leak check on assembly:

connector to manifold: -8 mmHg stable

probe to manifold: -8 mmHg stable

purged 2L with syringe

Maximum helium shroud concentration

86.9%

Maximum helium shroud sample train

concentration stopping - helium leak test passed

start 1719 16TSSV01

end 1726 can 10 2195 final -3 mmHg

1748 terminate collection of 16TSSA01 (-5 mmHg)

1805 terminate collection of 16TSSA02 (-5 mmHg)

CEL/ANR/EPA offsite @ 1810

Arrive Minocqua 1830

4/2/16

1100 Ship summer containers to Pace E Postal Express
2 FedEx boxes:

16T5AAD1 interior ambient air

16T5AAD2 exterior ambient air

16T5SVD1 soil vapor probe point

decan pump, suit gear, fuel rental vehicle
for water sampling tomorrow

soil sample management - QC labels,
bubble wrap VAPs

Z

4/3/16

34160024

0730 Mob gear, check out
calibrate turbidimeter, YSI

YSI DO @ 99% after calibration
in air. DO estimates will run high.

0810 Setup on MW-20 (shallow)
guel recharge, strong fuel odor

1010 16T5GW04 @ MW-20 (shallow)

1135 16T5GW05 @ MW-20 (deep) pump @ 22.5'

Arrive Minneapolis

Ship bladder pump to GeoTech @ FedEx
Minneapolis location

End 1700

Z

4/4/16

0900

Hand deliver soil and groundwater samples to
Pace - 2 coolers with ice, 2 GC's
one cooler with groundwater samples + drip block
one cooler with soil samples + drip block

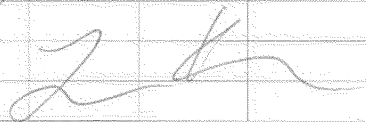
Pack equipment in boxes, clean rental vehicle

1530

Arrive airport, return rental car

2 checked overnight bags Delta

MSP → ANC



GROUNDWATER LOW-FLOW PURGING FORM

Date: 4/03/16 Well ID: MW-200 (deep)
 Job Name: Tower Stand
 Job Number: 31160034 Well Type: ☒ Monitor ☐ Extraction ☐ Other
 Company: BERS Well Material: ☒ PVC ☐ St. Steel ☐ Other
 Purged by: L Kleppin (print name) [Signature] (signature)
 Sample ID: 16TSGW05 Time: 1135
 QC Sample ID: _____ Time: _____

WELL PURGING

PURGE VOLUME (3 casing volumes OR 3 consecutive stable parameter measurements)

PURGE METHOD

Casing Diameter (D in inches)

Pump - Type: geotech

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other _____

☐ Submersible ☐ Centrifugal ☒ Bladder ☐ Peristaltic

A. Historical total Depth of Casing (TD in feet BTOC): _____

PUMP INTAKE SETTING

B. Water Level Depth (WL in feet BTOC): 7.22

Pump Depth in feet (BTOC) ~ 22.5

C. Water Column Length (A-B): _____

Screen Interval in feet (BTOC) 20-25

D. Water Column Volume (Cx 0.15 for 2-inch diameter
0.65 for 4-inch diameter): _____

PURGE TIME

PURGE RATE

ACTUAL PURGE VOLUME

1039 Start 1133 Stop 54 Elapsed Initial 0.06 gpm Final 0.06 gpm 3 gallons

FIELD PARAMETER MEASUREMENT (collect parameters every 5 minutes)

Time	Water Depth below MP	Discharge/Fill Pump Dial	100-400 Purge Rate (ml/min)	Temperature (°C)	Specific Cond. (mS/cm) ^a (± 3%)	pH (± 0.1)	ORP (mV) (± 10)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10% or <5 NTU)	Cumulative Volume Purged (<3 casing volumes)
1039	7.24	5/10	210	7.32	0.948	6.20	-20.3	5.01	151	
1043	7.24	5/10		7.96	0.957	6.20	-18.2	4.12	152	0.4
1052	7.24	5/10		8.28	0.961	6.20	-16.0	2.52	134	1
1104	7.24	5/10		8.32	0.969	6.16	-10.7	2.00	623	1.5
1109	7.24	5/10		8.15	0.968	6.19	-9.4	0.89	56.2	2
1113	7.24	5/10		8.19	0.968	6.19	-8.8	0.72	52.6	2
1117	7.24	5/10		8.25	0.970	6.19	-8.1	0.71	50.9	2.3
1121	7.24	5/10		8.46	0.970	6.21	-7.2	0.63	44.5	2.5
1124	7.24	5/10		8.73	0.972	6.21	-7.0	0.53	41.3	2.8
1130	7.24	5/10		8.36	0.972	6.20	-7.1	0.52	39.3	2.9
1133	7.24	5/10		8.35	0.972	6.19	-6.6	0.60	37.0	3

If well is purged dry, allow water column to recharge to 80% (Cx0.8 +A) and collect sample.

Remarks (well recovery, odor, sheen, unusual conditions/observations):

strong fuel odor, orange clearing to yellow

Well Integrity (condition of casing, end cap, monument, bollards, etc.):

good condition

GROUNDWATER LOW-FLOW PURGING FORM

Date: 04/03/16 Well ID: MW-20 shallow
 Job Name: Tower Standart
 Job Number: 34160024 Well Type: ☒ Monitor ☐ Extraction ☐ Other
 Company: BERS Well Material: ☒ PVC ☐ St. Steel ☐ Other
 Purged by: L. Kleppin (print name) [Signature] (signature)
 Sample ID: 16TSCW04 Time: 1010
 QC Sample ID: _____ Time: _____

WELL PURGING

PURGE VOLUME (3 casing volumes OR 3 consecutive stable parameter measurements)

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other _____

PURGE METHOD

☐ Pump - Type: gloster

☐ Submersible ☐ Centrifugal ☒ Bladder ☐ Peristaltic

A. Historical total Depth of Casing (TD in feet BTOC): _____

B. Water Level Depth (WL in feet BTOC): 7.00

C. Water Column Length (A-B): _____

D. Water Column Volume (Cx 0.15 for 2-inch diameter
0.65 for 4-inch diameter): _____

PUMP INTAKE SETTING

Pump Depth in feet (BTOC) 9'

Screen Interval in feet (BTOC) _____

PURGE TIME

PURGE RATE

ACTUAL PURGE VOLUME

0858 Start 1006 Stop 68 Elapsed Initial 0.12 gpm Final 0.12 gpm 8 gallons

FIELD PARAMETER MEASUREMENT (collect parameters every 5 minutes)

Time	Water Depth below MP	Discharge/Fill Pump Dial	100-400 Purge Rate (ml/min)	Temperature (°C)	Specific Cond. (mS/cm) ^c (± 3%)	pH (± 0.1)	ORP (mV) (± 10)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10% or <5 NTU)	Cumulative Volume Purged (<3 casing volumes)
0858	7.00	5/10	440	6.34	0.910	6.12	37.3	4.90	85.3	
0902	↓	5/10								
0909	↓	5/10		6.69	0.996	6.29	11.9	3.66	72.6	1.8
0919	7.06	5/7		6.87	0.999	6.36	-4.1	2.15	43.6	3
0930	7.06	5/7		6.90	1.008	6.35	-14.0	1.27	28.1	4
0940	7.06	5/7		6.94	1.014	6.38	-22.0	0.78	20.7	5
0945	7.06	5/7		6.93	1.012	6.38	-24.2	0.74	14.4	
0954	7.06	5/7		6.98	1.010	6.97	-29.4	0.50	10.7	7
0957	7.06	5/7		6.99	1.013	6.45	-29.3	0.55	10.0	
1000	7.06	5/7		7.01	1.010	6.37	-30.7	0.62	8.52	7.5
1003	7.06	5/7		6.99	1.009	6.38	-32.1	0.50	7.61	
1006	7.06	5/7		6.97	1.011	6.38	-32.9	0.50	7.72	8

If well is purged dry, allow water column to recharge to 80% (Cx0.8 +A) and collect sample.

Remarks (well recovery, odor, sheen, unusual conditions/observations): _____

strong fuel odor, orange

Well Integrity (condition of casing, end cap, monument, bollards, etc.): _____

good condition. Well may have "sunk" up to 4" - top of PVC in sand + bentonite. Scraped bentonite at around PVC.

GROUNDWATER LOW-FLOW PURGING FORM

Date: 3/29/16 Well ID: MW-16D (deep)
 Job Name: Tower Standard
 Job Number: 34160024 Well Type: ☒ Monitor ☐ Extraction ☐ Other
 Company: BERS Well Material: ☒ PVC ☐ St. Steel ☐ Other
 Purged by: Lyndsey Kleppin (print name) [Signature] (signature)
 Sample ID: 166W 16 TSGW 2 Time: 1245
 QC Sample ID: 16 TS GW 3 Time: 1300

VOCs, sulfate, nitrate, manganese, iron

WELL PURGING

PURGE VOLUME (3 casing volumes OR 3 consecutive stable parameter measurements)

PURGE METHOD

Casing Diameter (D in inches)

Pump - Type: geotech

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other

☐ Submersible ☐ Centrifugal ☒ Bladder ☐ Peristaltic

A. Historical total Depth of Casing (TD in feet BTOC): ~42.00

PUMP INTAKE SETTING

B. Water Level Depth (WL in feet BTOC): 1.92

Pump Depth in feet (BTOC) ~39.5

C. Water Column Length (A-B): 40.8

Screen Interval in feet (BTOC) 37-42

D. Water Column Volume (Cx 0.15 for 2-inch diameter
0.65 for 4-inch diameter): 6.12

PURGE TIME

PURGE RATE

ACTUAL PURGE VOLUME

1115 Start 1245 Stop 90 Elapsed Initial 0.03 gpm Final 0.03 gpm 3 gallons

FIELD PARAMETER MEASUREMENT (collect parameters every 5 minutes)

Time	Water Depth below MP	Discharge/ Pump Dial	100-400 Purge Rate (ml/min)	Temperature (°C)	Specific Cond. (mS/cm) ^c (± 3%)	pH (± 0.1)	ORP (mV) (± 10)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10% or <5 NTU)	Cumulative Volume Purged (<3 casing volumes)
1118	2.06	8/10	130	8.02	0.856	6.96	-24.5	4.53	26.4	0.54
1126	2.04	↓		7.91	0.890	7.04	-61.7	2.60	446	0.25
1136	2.04	↓		7.90	0.922	7.08	-80.5	2.14	583	0.75
1140	2.03	↓		7.96	0.928	7.09	-84.4	1.99	589	
1152	2.02	↓		8.00	0.945	7.13	-100.0	1.58	536	1.25
1202	2.04	↓		8.25	0.948	7.15	-110.5	1.28	466	1.5
1212	2.00	↓		8.23	0.943	7.14	-108.8	1.74	379	1.75
1218	2.02			8.23	0.952	7.17	-115.8	0.62	355	2.0
1226	2.02			8.39	0.956	7.20	-122.8	0.44	315	
1236	2.02			8.36	0.958	7.21	-125.0	0.39	290	
1240	2.01			8.43	0.958	7.21	-126.9	0.35	262	
1245	2.02			8.54	0.958	7.22	-129.0	0.37	258	3

If well is purged dry, allow water column to recharge to 80% (Cx0.8 +A) and collect sample.

Remarks (well recovery, odor, sheen, unusual conditions/observations): Strong fuel odor, no sheen

Well Integrity (condition of casing, end cap, monument, bollards, etc.): good

GROUNDWATER LOW-FLOW PURGING FORM

Date: 3/29/16 Well ID: MW-16 (shallow)
 Job Name: Tower Standard
 Job Number: 34160024 Well Type: ☒ Monitor ☐ Extraction ☐ Other
 Company: BERS Well Material: ☒ PVC ☐ St. Steel ☐ Other
 Purged by: Math Faust (print name) [Signature] (signature)
 Sample ID: 16TSGW01 Time: 1030
 QC Sample ID: _____ Time: _____

WELL PURGING

PURGE VOLUME (3 casing volumes OR 3 consecutive stable parameter measurements)

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other _____

PURGE METHOD

☐ Pump - Type: geotech
☐ Submersible ☐ Centrifugal ☒ Bladder ☐ Peristaltic

A. Historical total Depth of Casing (TD in feet BTOC): 11.48
 B. Water Level Depth (WL in feet BTOC): 2.08
 C. Water Column Length (A-B): 9.40
 D. Water Column Volume (Cx 0.15 for 2-inch diameter
 0.65 for 4-inch diameter): 1.41

PUMP INTAKE SETTING

Pump Depth in feet (BTOC) ~4.0 ft
 Screen Interval in feet (BTOC) _____

PURGE TIME

PURGE RATE

ACTUAL PURGE VOLUME

0922 Start 1030 Stop 68 Elapsed Initial 0.05 gpm Final 0.05 gpm 3.75 gallons

FIELD PARAMETER MEASUREMENT (collect parameters every 5 minutes)

Time	Water Depth below MP	Discharge/ Fall Pump Dial	100-400 Purge Rate (ml/min)	Temperature (°C)	Specific Cond. (mS/cm) ^F (± 3%)	pH (± 0.1)	ORP (mV) (± 10)	DO (mg/L) (± 10%)	Turbidity (NTU) (± 10% or <5 NTU)	Cumulative Volume Purged (<3 casing volumes)
0922	2.29	6/15	200	4.48	0.281	5.69	64.6	5.79	222	~0
0932	2.30	6/15		4.79	0.225	6.05	21.4	1.33	68.7	0.6
0938	2.32			4.99	0.231	6.26	6.1	0.96	56.0	0.9
0948	2.32			5.30	0.243	6.34	-2.9	0.64	56.0	1.5
0952	2.32			5.39	0.250	6.36	-5.1	0.63	51.1	1.75
0958	2.32			5.44	0.283	6.38	-8.5	0.57	41.3	2.15
1002	2.32			5.46	0.306	6.39	-11.8	0.52	37.9	2.40
1008	2.32			5.53	0.337	6.42	-16.6	0.53	32.2	2.7
1012	2.32			5.48	0.355	6.46	-20.3	0.50	28.5	2.9
1018	2.32			5.52	0.373	6.50	-24.6	0.48	19.9	3.25
1022	2.30			5.65	0.385	6.51	-26.7	0.52	15.0	3.45
1028	2.28			5.64	0.399	6.52	-29.9	0.71	10.8	3.75
1030									8.67	

If well is purged dry, allow water column to recharge to 80% (Cx0.8 +A) and collect sample.

Remarks (well recovery, odor, sheen, unusual conditions/observations): No odor, murky, yellow initially
Slight oil odor?

Well Integrity (condition of casing, end cap, monument, bollards, etc.): Good. Cover rusted on.

INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

Preparer's Name BOB EGAN Date/Time Prepared 4/1/16 1615

Preparer's Affiliation USEPA Phone No. 312 886-6212

Purpose of Investigation LOST SITE

1. OCCUPANT: BUSINESS PROPRIETOR

Interviewed: ☒ Yes ☐ No N/A

Last Name: KOSAK First Name: WILLIAM

Address: 14267 HWY 20 WEST

County: VILAS Home Phone: N/A Office Phone: N/A

Number of Occupants/persons at this location 2 Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ☐)

Interviewed: ☒ Yes ☐ No

Last Name: KOSAK First Name: WILLIAM

Address: _____

County: DWIGHT Home Phone: 715 580-3934 Office Phone: —

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential

School

Commercial/Multi-use

Industrial

Church

Other: RETAIL BAIT SHOP

If the property is residential, type? (Circle appropriate response)

Ranch

2-Family

3-Family

Raised Ranch

Split Level

Colonial

Cape Cod

Contemporary

Mobile Home

Duplex

Apartment House

Townhouse/Condos

Modular

Log Home

Other: _____

If multiple units, how many: _____

If the property is commercial, type?

Business Type(s) BART SHOP

Does it include residences (i.e., multi-use)? ☐ Yes ☒ No If yes, how many? _____

Other characteristics:

Number of floors 1

Building age 70+

Is the building insulated? ☐ Yes ☒ No How air tight? Tight / Average Not Tight

4. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

- | | | | | | |
|------------------------------|------------------------------|--|-----------------------|-------|-----------------------|
| a. Above grade construction: | wood frame | concrete | stone | brick | <u>CONCRETE BLOCK</u> |
| b. Basement type: | full | crawlspace | slab | other | <u>NONE</u> |
| c. Basement floor: | concrete | dirt | stone | other | <u>NONE</u> |
| d. Basement floor: | uncovered | covered | covered with | | <u>NONE</u> |
| e. Concrete floor: | unsealed | <u>sealed</u> | sealed with | | <u>PAINT</u> |
| f. Foundation walls: | poured | block | stone | other | <u>UNKNOWN</u> |
| g. Foundation walls: | unsealed | sealed | sealed with | | <u>UNKNOWN</u> |
| h. The basement is: | wet | damp | dry | moldy | |
| i. The basement is: | finished | unfinished | partially finished | | |
| j. Sump present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | | | |
| k. Water in sump: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <u>not applicable</u> | | |

Basement/Lowest level depth below grade: _____ (feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

NO UNUSUAL CRACKS OBSERVED IN SHOP AREA

POSSIBLE GROSS CONTAMINATION FROM FORMER AUTO SERVICE BAY AREA

5. HEATING, VENTING, AND AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

- | | | |
|----------------------------|------------------|---------------------|
| <u>Hot air circulation</u> | Heat pump | Hot water baseboard |
| Space Heaters | Stream radiation | Radiant floor |
| Electric baseboard | Wood stove | Outdoor wood boiler |
| | | Other: <u>NONE</u> |

f. Is there a workshop or hobby/craft area?

Y ☒ N Where & What Type? _____

g. Is there smoking in the building?

Y ☒ N How frequently? _____

h. Have cleaning products been used recently?

Y ☒ N When & What Type? _____

i. Have cosmetic products been used recently?

Y ☒ N When & What Type? _____

j. Has painting/staining been done in the last 6 months?

Y ☒ N Where & When? _____

k. Is there new carpet, drapes or other textiles?

Y ☒ N Where & When? _____

l. Have air fresheners been used recently?

Y ☒ N When & What Type? _____

m. Is there a kitchen exhaust fan?

Y ☒ N If yes, where vented? _____

n. Is there a bathroom exhaust fan?

Y ☒ N If yes, where vented? _____

o. Is there a clothes dryer?

Y ☒ N If yes, is it vented outside? Y/N

p. Has there been a pesticide application?

Y ☒ N When & What Type? _____

Are there odors in the building?

Y ☒ N

If yes, please describe: ONLY THOSE RELATED TO BUILDING BEING CLOSED - MUSTY ODORS

Do any of the building occupants use solvents at work?

Y ☒ N

(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist)

If yes, what type of solvents are used? _____

If yes, are their clothes washed at work?

Y ☒ N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)

☒ No

Yes, use dry-cleaning infrequently (monthly or less)

Unknown

Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure?

Y ☒ N Date of installation: _____

Is the system active or passive?


Active/Passive





MATERIALS STORED IN AUTO SERVICE (FORMER) AREA

- FIBERGLASS RESIN
- HOUSEHOLD PAINT CANS
- RUSTOLEUM SPRAY CAN
- MOTOR OIL
- ATF FLUID
- AUTO PAINT IN CANS (2)
- CARB CLEANER
- BATTERY SEALER
- WOOD CLEANER
- OLD WASTE OIL TANKS (UNUSED/EMPTY)


ATTACHMENT 3





Soil Boring Logs





Bristol		BOREHOLE LOG				SHEET 1 OF 2 SHEETS	
 ENVIRONMENTAL REMEDIALATION SERVICES, LLC		BOREHOLE LOCATION 45.913713467° N, -89.913093495° W			DRILLING COMPANY Coleman Engineering		
		COORDINATE SYSTEM AND DATUM Lat/Long, WGS84			DRILL RIG Geoprobe 6620 DT		
PROJECT Tower Standard LUST Site		ELEVATION AT TOP OF HOLE 479.462239 feet			DRILLING METHOD Direct Push		
CLIENT EPA Region 5		ELEVATION AT TOP OF CASING Not Applicable			DRILLER Randy Ochs		
JOB NUMBER 34160024		ELEVATION DATUM height above ellipsoid			BOREHOLE DIAMETER 3 inches		
SITE Tower Standard		TOTAL DEPTH 30 feet	DEPTH TO WATER 8.5 feet		LOGGED BY Lyndsey Kleppin		
LOCATION Lac du Flambeau		GROUNDWATER ELEVATION 470.962239 feet			DATE HOLE	STARTED 3/30/2016	COMPLETED 3/30/2016




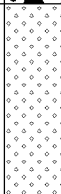


DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	PID SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
0.0		(GW) sandy gravel with clay, reddish brown, moist, slight fuel odor					
2.0							
4.0							
5.0		(SW) gravelly sand with silt, brown, moist, loose, moderate fuel odor					
6.0							
8.0							
8.5							
10.0		(SW) sand, brown, wet, loose, very fine to coarse grained, strong fuel odor, sheen					
11.0							
12.0		(SW) sand with gravel, brown, wet, loose, trace clay, strong fuel odor, sheen					
14.0							

BOREHOLE LOG (Cont)		ELEVATION TOP OF HOLE 479.462239 feet		Borehole No. 16BH01			
PROJECT Tower Standard LUST Site			SITE Tower Standard			SHEET 2 OF 2 SHEETS	
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
15.0		(SW) sand with silt, brown, wet, loose, medium grained, moderate fuel odor			111.5		
16.0		(SP) sand, brown, wet, loose, medium grained, slight fuel odor			59.9		
18.0		(SW) sand, brown, wet, loose, medium to coarse grained, slight fuel odor		60%	32.7		
19.0		(SP) sand, brown, wet, loose, fine grained, slight fuel odor			52		
20.0		(SP) sand, brown, wet, loose, medium grained, slight fuel odor			32		
22.0		(SP) sand, brown, wet, loose, medium grained, slight fuel odor [possibly slough]		90%	30.8		
24.0		(SW) sand with gravel, brown, wet, loose, coarse to medium grained sand, slight fuel odor			18.7		
26.0							
28.0				20%	18.7		
30.0		Bottom of Borehole					







Bristol		BOREHOLE LOG				SHEET 1 OF 2 SHEETS	
 ENVIRONMENTAL REMEDIALATION SERVICES, LLC		BOREHOLE LOCATION 45.91373049° N, -89.913159829° W			DRILLING COMPANY Coleman Engineering		
		COORDINATE SYSTEM AND DATUM Lat/Long, WGS84			DRILL RIG Geoprobe 6620 DT		
PROJECT Tower Standard LUST Site		ELEVATION AT TOP OF HOLE 479.494875 feet			DRILLING METHOD Direct Push		
CLIENT EPA Region 5		ELEVATION AT TOP OF CASING Not Applicable			DRILLER Randy Ochs		
JOB NUMBER 34160024		ELEVATION DATUM height above ellipsoid			BOREHOLE DIAMETER 3 inches		
SITE Tower Standard		TOTAL DEPTH 30 feet	DEPTH TO WATER 9 feet		LOGGED BY Lyndsey Kleppin		
LOCATION Lac du Flambeau		GROUNDWATER ELEVATION 470.494875 feet			DATE HOLE	STARTED 3/30/2016	COMPLETED 3/30/2016


DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	PID SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
0.0		(SM) silty sand with clay, brown, moist, dense, trace gravel, no fuel odor					
2.0							
4.0							
5.0		(SW) sand with clay and gravel, brown, moist, loose, no fuel odor					
6.0							
8.0							
9.5		(SW) gravelly sand, brown, wet, loose, no fuel odor					
10.0							
		(SW) sand, brown, wet, loose, fine to medium grained, trace clay, moderate fuel odor					
12.0							


BOREHOLE LOG (Cont)		ELEVATION TOP OF HOLE 479.494875 feet		Borehole No. 16BH02			
PROJECT Tower Standard LUST Site			SITE Tower Standard			SHEET 2 OF 2 SHEETS	
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
15.0		(SW) sand, brown, wet, loose, fine to medium grained, trace clay, moderate fuel odor (<i>continued</i>)					
16.0		(SP) sand, brown, wet, loose, medium grained, slight fuel odor			11.7		
18.0				80%	7.4		
19.0							
20.0		(SW) sand with clay and gravel, brown, loose, wet, grey clay inclusion with strong fuel odor, slight fuel odor in sand			23		
22.0		(SW) sand, greyish brown, wet, loose, medium to coarse grained, slight fuel odor					
24.0				30%	6.2		
25.0		(GW) gravel with sand, greyish brown, wet, loose, slight fuel odor			2.7		
26.0		No Recovery			20		
28.0				0%			
30.0		Bottom of Borehole					





 Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC		BOREHOLE LOG		SHEET 1 OF 2 SHEETS			
		BOREHOLE LOCATION 45.913683436° N, -89.913124832° W		DRILLING COMPANY Coleman Engineering			
COORDINATE SYSTEM AND DATUM Lat/Long, WGS84		DRILL RIG Geoprobe 6620 DT					
PROJECT Tower Standard LUST Site		ELEVATION AT TOP OF HOLE 479.488087 feet		DRILLING METHOD Direct Push			
CLIENT EPA Region 5		ELEVATION AT TOP OF CASING Not Applicable		DRILLER Randy Ochs			
JOB NUMBER 34160024		ELEVATION DATUM height above ellipsoid		BOREHOLE DIAMETER 3 inches			
SITE Tower Standard		TOTAL DEPTH 20 feet	DEPTH TO WATER 9 feet	LOGGED BY Lyndsey Kleppin			
LOCATION Lac du Flambeau		GROUNDWATER ELEVATION 470.488087 feet		DATE HOLE	STARTED 3/30/2016		
				COMPLETED 3/30/2016			
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	PID SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
0.0		(GW) sandy gravel, brownish grey, moist, loose					
2.0				10%			
4.0						22.3	
5.0							
6.0		(GW) sandy gravel, olive grey, moist, loose, strong fuel odor					
7.0							
8.0		(SW) sand, brown, moist, loose, fine to coarse grained, moderate fuel odor		50%	730.2	16TSSL04	
9.0							
10.0		(SW) sand with gravel, greyish brown, wet, loose, coarse grained sand, moderate fuel odor			640.5		
12.0							
13.0		(SW) sand, greyish brown, wet, loose, medium to coarse grained, strong fuel odor		20%	1451		

BOREHOLE LOG (Cont)		ELEVATION TOP OF HOLE 479.488087 feet		Borehole No. 16BH03			
PROJECT Tower Standard LUST Site			SITE Tower Standard			SHEET 2 OF 2 SHEETS	
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
		(SW) sand, greyish brown, wet, loose, medium to coarse grained, strong fuel odor (<i>continued</i>)			1908	16TSSL05	
16.0		(SP) sand, brown, wet, loose, medium grained, slight fuel odor			22.5		
17.0					10.7		
18.0		(SW) gravelly sand, brown, wet, loose, fine to coarse grained sand, slight fuel odor heaving sand at 20' bgs, boring terminated at 20' bgs		70%	15.5		
20.0					24.6		
		Bottom of Borehole					


 Bristol ENVIRONMENTAL REMEDIATION SERVICES, LLC		BOREHOLE LOG		SHEET 1 OF 2 SHEETS				
		BOREHOLE LOCATION 45.913698811° N, -89.912972296° W		DRILLING COMPANY Coleman Engineering				
COORDINATE SYSTEM AND DATUM Lat/Long, WGS84		DRILL RIG Geoprobe 6620 DT						
PROJECT Tower Standard LUST Site		ELEVATION AT TOP OF HOLE 479.432530 feet		DRILLING METHOD Direct Push				
CLIENT EPA Region 5		ELEVATION AT TOP OF CASING Not Applicable		DRILLER Randy Ochs				
JOB NUMBER 34160024		ELEVATION DATUM height above ellipsoid		BOREHOLE DIAMETER 3 inches				
SITE Tower Standard		TOTAL DEPTH 20 feet	DEPTH TO WATER 8.5 feet	LOGGED BY Lyndsey Kleppin				
LOCATION Lac du Flambeau		GROUNDWATER ELEVATION 470.93253 feet		DATE HOLE	STARTED 3/31/2016			
				COMPLETED 3/31/2016				
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	PID SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES	
0.0		(GW) sandy gravel with silt and clay, brown, moist, loose, slight fuel odor			78.6			
2.0				50%				
4.0		4.0	(GW) sandy gravel, brown, moist, loose, slight fuel odor					52.1
6.0		6.0	(SW) gravelly sand with silt, brown, moist, loose, moderate fuel odor					18.6
8.0		(SW) gravelly sand with silt, brown, wet, loose, strong fuel odor, sheen			40			
10.0		10.0	(GW) sandy gravel, brown, wet, loose, trace silt and clay, fine to coarse gravel					1210
12.0				60%				
14.0						1314		




BOREHOLE LOG (Cont)		ELEVATION TOP OF HOLE 479.432530 feet		Borehole No. 16BH04			
PROJECT Tower Standard LUST Site			SITE Tower Standard			SHEET 2 OF 2 SHEETS	
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
		(GW) sandy gravel, brown, wet, loose, trace silt and clay, fine gravel heaving sand at 20' bgs, boring terminated at 20' bgs			117.5		
16.0					82.2		
18.0			60%	24.3			
20.0				42			
20.0		Bottom of Borehole					

Bristol		BOREHOLE LOG				SHEET 1 OF 2 SHEETS	
 ENVIRONMENTAL REMEDIALATION SERVICES, LLC		BOREHOLE LOCATION 45.913662247° N, -89.913051165° W		DRILLING COMPANY Coleman Engineering			
		COORDINATE SYSTEM AND DATUM Lat/Long, WGS84		DRILL RIG Geoprobe 6620 DT			
PROJECT Tower Standard LUST Site		ELEVATION AT TOP OF HOLE 479.464763 feet		DRILLING METHOD Direct Push			
CLIENT EPA Region 5		ELEVATION AT TOP OF CASING Not Applicable		DRILLER Randy Ochs			
JOB NUMBER 34160024		ELEVATION DATUM height above ellipsoid		BOREHOLE DIAMETER 3 inches			
SITE Tower Standard		TOTAL DEPTH 30 feet	DEPTH TO WATER 8.5 feet	LOGGED BY Lyndsey Kleppin			
LOCATION Lac du Flambeau		GROUNDWATER ELEVATION 470.964763 feet		DATE HOLE	STARTED 3/31/2016	COMPLETED 3/31/2016	

DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	PID SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
0.0		(SW) gravelly sand with clay, brown, moist, loose, grey silty clay inclusions, no fuel odor					
2.0							
4.0							
6.0							
7.0		(GW) sandy gravel, greyish brown, moist, loose					
8.0							
8.5		(SW) gravelly sand, brown, wet, loose, strong fuel odor					
10.0							
10.0		(SW) gravelly sand with silt, brown, wet, loose, strong fuel odor, sheen					
12.0							

BOREHOLE LOG (Cont)		ELEVATION TOP OF HOLE 479.464763 feet		Borehole No. 16BH05			
PROJECT Tower Standard LUST Site			SITE Tower Standard			SHEET 2 OF 2 SHEETS	
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
		(SW) gravelly sand with silt, brown, wet, loose, strong fuel odor, sheen <i>(continued)</i>			117.5		
16.0		(SW) sand, brown, wet, loose, fine to coarse grained, slight fuel odor		20%	50.1		
20.0		No Recovery- heaving sand			70.7		
29.8		(GW) sandy gravel, wet, loose, no fuel odor					
30.0		Bottom of Borehole					

Bristol		BOREHOLE LOG				SHEET 1 OF 2 SHEETS	
 ENVIRONMENTAL REMEDIAL SERVICES, LLC		BOREHOLE LOCATION 45.913606619° N, -89.913215927° W			DRILLING COMPANY Coleman Engineering		
		COORDINATE SYSTEM AND DATUM Lat/Long, WGS84			DRILL RIG Geoprobe 6620 DT		
PROJECT Tower Standard LUST Site		ELEVATION AT TOP OF HOLE 479.719090 feet			DRILLING METHOD Direct Push		
CLIENT EPA Region 5		ELEVATION AT TOP OF CASING Not Applicable			DRILLER Randy Ochs		
JOB NUMBER 34160024		ELEVATION DATUM height above ellipsoid			BOREHOLE DIAMETER 3 inches		
SITE Tower Standard		TOTAL DEPTH 20 feet	DEPTH TO WATER 9 feet		LOGGED BY Lyndsey Kleppin		
LOCATION Lac du Flambeau		GROUNDWATER ELEVATION 470.71909 feet			DATE HOLE	STARTED 3/31/2016	COMPLETED 3/31/2016

DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	PID SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
0.0		(SW) sand, brown, moist, loose, fine to coarse grained, no fuel odor					
2.0					7		
2.5				20%	6.4		
4.0		(SW) gravelly sand with silt, reddish brown, moist, loose, trace clay, no fuel odor			3.6		
5.0							
6.0		No Recovery- rock lodged in sample tube					
8.0				0%			
10.0							
12.0				50%	2.2		

BOREHOLE LOG (Cont)		ELEVATION TOP OF HOLE 479.719090 feet		Borehole No. 16BH06			
PROJECT Tower Standard LUST Site			SITE Tower Standard			SHEET 2 OF 2 SHEETS	
DEPTH (FEET)	GRAPHIC LOG	LITHOLOGY DESCRIPTION	SAMPLE INTERVAL	RECOVERY	PID (ppm)	ANALYTICAL SAMPLE	DRILLING NOTES
<div style="text-align: center;">16.0</div> <div style="text-align: center;">16.5</div> <div style="text-align: center;">18.0</div> <div style="text-align: center;">20.0</div>		<div style="text-align: center;">(SW) sand, brown, wet, loose, fine to medium grained, no fuel odor <i>(continued)</i></div> <div style="text-align: center;">(SW) gravelly sand, brown, wet, loose, trace silt, no fuel odor</div> <div style="text-align: center;">Bottom of Borehole</div>	<div style="text-align: center;">16.0</div> <div style="text-align: center;">16.5</div> <div style="text-align: center;">18.0</div> <div style="text-align: center;">20.0</div>	<div style="text-align: center;">70%</div>	<div style="text-align: center;">1.4</div>	<div style="text-align: center;">16TSSL11</div>	